New generation of the hybrid structures based on perovskites, oxides and organic compounds for photovoltaic applications

This project is dedicated to a new generation of hybrid materials dedicated for photovoltaics and nonlinear optics. Investigated materials will contain absorbent like perovskite materials with crystalline structure of ABX_3 (A - is an organometallic compound, B - transition metal and X - a halogen atom), complexes of porphyrins, phthalocyanines and quinoline with metals and simple oxides include zinc oxide and neodymium.

Perovskites are minerals occurring in nature, but they may as well produce a by replacing different elements or chemical groups and maintaining a specific crystalline structure Possibility of choosing composition of the perovskites with a wide range of organic and inorganic materials leads to various properties.

A few years ago perovskites were not related great expectations, and today they are undoubtedly the hope of photovoltaics. They can replace the popular so far silicon within the solar cells, which in the final result is more expensive than perovskites. After three years from fabrication of the first perovskites solar cell were achieved - in laboratory scale - an efficiency of 20%. It is the fastest growing technology in the history of photovoltaics.

Research will be focus on the interrelationship that exists between the structure and optical as well as electrical properties, because mainly these properties determine the photo-physical processes responsible for the effective of the increase sunlight conversion into electricity. A consequent affect photovoltaic cells efficiency.

Some of the work will be devoted to the processes of self-organization within mixed structures on the basis of perovskites, oxides and organic compounds,

I want to devote examinations of nonlinear optical properties of nanostructured layers for individual compounds responsible for the non-linear optical properties and multi-functional character.